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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/748,198	12/27/2000	Shinichi Kanna	Q62447	5369

7590 01/02/2003

SUGHRUE, MION, ZINN,  
MACPEAK & SEAS, PLLC  
2100 Pennsylvania Avenue, N.W.  
Washington, DC 20037

EXAMINER
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LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 01/02/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/748,198

Applicant(s)

KANNA ET AL

Examiner

Sin J Lee

Art Unit

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#9

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2 and 4-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2 and 4-21 is/are rejected.
- 7) ☒ Claim(s) 2, 6 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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### DETAILED ACTION

1. Applicants canceled claims 1 and 3.
2. In view of the amendment filed on December 17, 2002, the previously made rejections on present claims over Iwasa et al'025 in view of Kobayashi et al'500 and the previously made rejections on present claims over Tan et al'721 in view of Kobayashi et al'500 are hereby withdrawn. Neither combination of those prior arts teaches or suggests present R<sub>4</sub> group of present claim 21.
3. Claims 2, 6, and 7 are objected to because of the following informalities: applicants need to change "formula (I)" in those claims to --- formula (I') ---. Appropriate correction is required.
4. Due to newly cited prior arts, previously indicated allowability of present claim 21 is hereby withdrawn and the finality of the last Office action is hereby withdrawn. Therefore, the following rejections are made *non-final*. ✓
5. Claims 2, 4, 6-10, and 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Urano et al (5,670,299) in view of Kobayashi et al (6,136,500).

Urano et al teach a positive type photoresist composition comprising a polymer of the formula (II), a *photoacid generator*, and a *solvent*. See col.2, lines 66-67, col.3, lines 1-39, col.4, lines 29-42. Urano furthermore teaches that R<sup>2</sup> and R<sup>3</sup> of formula (II) can be hydrogen atom or an alkyl group of 1-6 carbon atoms and that R<sup>4</sup> group in the formula (II) can be an *alkyl group*, haloalkyl group or an *aralkyl group* (see col.4, lines 18-22). Specifically, in their Example 2,

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Urano uses *poly[p-(1-ethoxyethoxy)styrene/p-hydroxystyrene]* as the polymer of the formula (II). In this polymer,  $R^2$  would be a hydrogen atom,  $R^3$  would be a methyl group, and  $R^4$  would be an ethyl group (an alkyl group). It is the Examiner's position that it would have been obvious to one of ordinary skill in the art to replace the ethyl group (Urano's  $R^4$  group) in the polymer of Example 2 with an aralkyl group (also, Urano's  $R^4$  group) because Urano teaches the equivalence of an alkyl group (such as ethyl group) and aralkyl group as their  $R^4$  group. Urano furthermore teaches (col.4, line 67 - col.5, lines 1-3) that as the aralkyl group, *benzyl group*, phenethyl group, phenylpropyl group, methylbenzyl group, methylphenethyl group and ethylbenzyl group can be used. Since there are only several examples to choose from, it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to choose the benzyl group and replace the ethyl group in the polymer of Example 2 with the benzyl group, thus making *poly[p-(1-ethoxybenzyloxy)styrene/p-hydroxystyrene]* as Urano's polymer of formula (II), with a reasonable expectation of achieving a photoresist composition having excellent heat resistance and high resolution. The *poly[p-(1-ethoxybenzyloxy)styrene/p-hydroxystyrene]* teaches present resin having the acid-decomposing group of formula (I') since in the formula (I'),  $R_1$  can be a methyl group (an alkyl group of 1 carbon atom),  $n$  can be a number of 1, and  $R_4$  can be an unsubstituted aryl group. Furthermore, Urano teaches (col.10, lines 40-46) that *surfactants* can be added to his photoresist composition. Therefore, the prior art teaches present invention of claim 21 except for the present component (b-2).

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Kobayashi et al, a reference which teaches a positive type radiation sensitive resin composition, teaches (col.2, lines 42-59 and col.12, lines 50-65) that using a photoacid generator comprising (I) a compound that upon exposure to radiation generates a carboxylic acid and (ii) a compound that upon exposure to radiation generates an acid other than a carboxylic acid can markedly suppress the problems of “nano-edge roughness” or “coating surface roughness”. As particularly preferred acid generators that generates a carboxylic acid, Kobayashi includes *iodonium salts of carboxylic acids* and *sulfonium salts of carboxylic acids* (see col.15, lines 66-67, col.16, lines 1-7). Kobayashi also teaches (col.17, lines 63-65) that for the acid generators that generates an acid other than a carboxylic acid, compounds that upon exposure to radiation generates *sulfonic acid* and/or *sulfinic acid* are preferred. Urano’s photoacid generator also generates a *sulfonic acid* upon exposure to radiation (see col.11, lines 62-67, col.12, lines 1-40). Therefore, it is the Examiner’s position that based on Kobayashi’s teaching it would have been obvious to one of ordinary skill in the art to use iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids together with Urano’s photoacid generator in Urano’s invention in order to markedly suppress the problems of “nano-edge roughness” or “coating surface roughness” as taught by Kobayashi (Furthermore, in Kobayashi’s Tables 1 and 5, the direct comparison between the Example 1 (wherein B1 (the carboxylic acid-generating compound) and B2 (the sulfonic acid-generating compound) are used together) and the Comparative Example 1 (wherein B1 is not used) and the direct comparison between the *Example 5* (wherein B1 and B2 are used together) and the Comparative Example 2 (wherein B1 is not used) show that when one uses both

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of those acid generating compounds together, not only it suppresses problems of coating surface roughness, but also it improves resolution (see Table 5)).

Because the iodonium salts of carboxylic acids or the sulfonium salts of carboxylic acids are also cited (see pg.67, last paragraph of present specification) by applicants as examples for the photoacid generator (b-2), Urano in view of Kobayashi would render obvious present component (b-2), and either of iodonium salts of carboxylic acids and sulfonium salts of carboxylic acids would *inherently* make no contribution to the decomposition reaction of the acid-decomposable group as presently recited. Therefore, Urano in view of Kobayashi would render obvious present inventions of claims 21, 2, and 4.

With respect to present claims 6 and 7, Urano teaches (col.4, lines 25-26) that in their polymer of formula (II),  $k/(k+1)$  ranges *from 0.1 to less than 0.9* (10 to 90 mol%) wherein k is the molar fraction for the first repeating unit of the formula (II) which contains the acid-decomposing group. Since the prior art's range of 10 to 90 mol% overlaps with present ranges of claims 6 and 7, the prior art's range would have made the present ranges *prima facie*-obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Urano in view of Kobayashi would render obvious present inventions of claims 6 and 7.

With respect to present claims 8-10 and 12-14, in their Example 2, Urano uses 6.0 g of their polymer and 0.3 g of their photoacid generator. This gives 95.2 wt% of Urano's polymer

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excluding the solvent and 4.8 wt% of their photoacid generator excluding the solvent. Therefore, Urano in view of Kobayashi would render obvious present inventions of claims 8-10 and 12-14.

With respect to present claims 18-20, Kobayashi teaches (col.20, lines 40-44) that the weight ratio of the acid generator that generates a carboxylic acid to the acid generator that generates an acid other than a carboxylic acid is usually 0.01 to 5. Therefore, it would have been obvious to one of ordinary skill in the art to use iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids together with Urano's photoacid generator in Urano's invention in the weight ratio of 0.01-5 in order to markedly suppress the problems of "nano-edge roughness" or "coating surface roughness" as taught by Kobayashi. The prior art's range of 0.01 to 5 teaches present range of claim 18. The prior art's range also overlaps with present ranges of claims 19 and 20, and thus the prior art's range would have made the present ranges of claims 19 and 20 *prima facie* obvious. In re Wertheim, supra. Therefore, Urano in view of Kobayashi would render obvious present inventions of claims 18-20.

With respect to present claims 15-17, since Urano uses 0.3 grams of the photoacid generator in their Example 2 and since Kobayashi teaches (col.20, lines 40-44) that the weight ratio of the acid generator that generates a carboxylic acid to the acid generator that generates an acid other than a carboxylic acid is usually 0.01 to 5, this will give 0.003 - 1.5 grams for iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Assuming that one adds 0.003 grams of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids to the resist composition of Urano's Example 2, this will give 4.8 wt% of Urano's photoacid

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generator and 0.048 wt% of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Assuming that one adds 1.5 grams of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids, this will give 3.8 wt% of Urano's photoacid generator and 19 wt% of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Therefore, the amount of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids that is added to Urano's photoresist composition will range from 0.048-19 wt% excluding the solvent. This range for the amount of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids overlaps with present ranges of claims 15-17 thus rendering the present ranges of claims 15-17 *prima facie* obvious. In re Wertheim, supra. Therefore, Urano in view of Kobayashi would render obvious present inventions of claims 15-17.

6. Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Urano et al (5,670,299) in view of Kobayashi et al (6,136,500) as applied to claim 21 above, and further in view of Tan et al (6,004,721).

Urano in view of Kobayashi with respect to present claim 21 is discussed in Paragraph 5 above. With respect to present claim 5, Urano in view of Kobayashi do not explicitly teach the presently claimed organic basic compound. Tan teaches (col.44, lines 44-48) that adding an organic basic compound to a positive photoresist composition improves storage stability and reduces the line width change caused by PED (lapse of the time from exposure to baking). It is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add an organic basic compound into the photoresist composition taught by Urano in view of



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Kobayashi in order to improve storage stability and reduce the line width change caused by PED as taught by Tan et al. Therefore, Urano in view of Kobayashi and further in view of Tan et al would render obvious present invention of claim 5.

With respect to present claim 11, Urano in view of Kobayashi do not explicitly teach the presently claimed alkali-soluble resin without containing the acid-decomposing group. Tan teaches (col.19, lines 15-20) that an alkali-soluble resin not containing acid-decomposable groups can be added to a positive photoresist composition in order to improve sensitivity. It is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add an alkali soluble resin into the photoresist composition taught by Urano in view of Kobayashi in order to improve sensitivity as taught by Tan et al. Therefore, Urano in view of Kobayashi and further in view of Tan et al would render obvious present invention of claim 11.

7. Claims 2, 4-10, and 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiaki et al (JP 11-282163 and its English abstract provided by Derwent) in view of Kobayashi et al (6,136,500).

Full English translation for the Japanese document has been submitted. Only the English abstract by Derwent is available at this point.

According to PTO's on-site oral English translation of [0161]-[0163], in their Example 3 (see Table 2), Toshiaki teaches a positive type photosensitive composition comprising resin C5 (1.8 g) and a photoacid generator 4-2 (0.1g). Chemical structure for the resin C5 is shown in [0044] and chemical structure for the photoacid generator 4-2 is shown in [0073]. The third

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repeating unit of the resin C5 has the moiety of  $-\text{OC}(\text{H})(\text{CH}_3)-\text{O}-\text{CH}_2\text{CH}_2-\text{C}_6\text{H}_5$  which meets the present formula (I') of claim 21 (in the present formula,  $\text{R}_1$  can be a methyl group,  $\text{R}_4$  can be an unsubstituted aryl group, and  $n$  can be 2). Also, PTO's oral English translation of [0142] and [0153] indicates that Toshiaki's composition can contain *surfactants* as well as *organic basic compound* and that his composition is dissolved into a *solvent*. Therefore, the prior art teaches present invention of claim 21 except for the present component (b-2).

Kobayashi et al, a reference which teaches a positive type radiation sensitive resin composition, teaches (col.2, lines 42-59 and col.12, lines 50-65) that using a photoacid generator comprising (I) a compound that upon exposure to radiation generates a carboxylic acid and (ii) a compound that upon exposure to radiation generates an acid other than a carboxylic acid can markedly suppress the problems of "nano-edge roughness" or "coating surface roughness". As particularly preferred acid generators that generates a carboxylic acid, Kobayashi includes *iodonium salts of carboxylic acids* and *sulfonium salts of carboxylic acids* (see col.15, lines 66-67, col.16, lines 1-7). Kobayashi also teaches (col.17, lines 63-65) that for the acid generators that generates an acid other than a carboxylic acid, compounds that upon exposure to radiation generates *sulfonic acid* and/or *sulfinic acid* are preferred. Toshiaki's photoacid generator 4-2 also generates a *sulfonic acid* upon exposure to radiation (see the chemical structure of photoacid generator 4-2 in [0073]). Therefore, it is the Examiner's position that based on Kobayashi's teaching it would have been obvious to one of ordinary skill in the art to use iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids together with Toshiaki's photoacid

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generator in Toshiaki's invention in order to markedly suppress the problems of "nano-edge roughness" or "coating surface roughness" as taught by Kobayashi (Furthermore, in Kobayashi's Tables 1 and 5, the direct comparison between the Example 1 (wherein B1 (the carboxylic acid-generating compound) and B2 (the sulfonic acid-generating compound) are used together) and the Comparative Example 1 (wherein B1 is not used) and the direct comparison between the *Example 5* (wherein B1 and B2 are used together) and the Comparative Example 2 (wherein B1 is not used) show that when one uses both of those acid generating compounds together, not only it suppresses problems of coating surface roughness, but also it improves resolution (see Table 5)).

Because the iodonium salts of carboxylic acids or the sulfonium salts of carboxylic acids are also cited (see pg.67, last paragraph of present specification) by applicants as examples for the photoacid generator (b-2), Toshiaki in view of Kobayashi would render obvious present component (b-2), and either of iodonium salts of carboxylic acids and sulfonium salts of carboxylic acids would *inherently* make no contribution to the decomposition reaction of the acid-decomposable group as presently recited. Therefore, Toshiaki in view of Kobayashi would render obvious present inventions of claims 21, 2, 4, and 5.

With respect to present claims 6 and 7, according to PTO's oral translation of [0161], the molar ratio for each of the repeating units of the resin C-5 is 65/20/15 (the hydroxystyrene unit being 65 and the third repeating unit with -OC(H)(CH<sub>3</sub>)-O-CH<sub>2</sub>CH<sub>2</sub>-C<sub>6</sub>H<sub>5</sub> moiety being 15). This means that 18.8 mol% of the hydroxy groups of the hydroxystyrene repeating unit is protected by

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the  $\text{-OC(H)(CH}_3\text{)-O-CH}_2\text{CH}_2\text{-C}_6\text{H}_5$  moiety. Therefore, Toshiaki in view of Kobayashi would render obvious present inventions of claims 6 and 7.

With respect to present claims 8-10 and 12-14, since Toshiaki uses 1.8 g (95wt% *excluding the solvent*) of resin C5 and 0.1 g (5wt% *excluding the solvent*) of their photoacid generator in their Example 3, Toshiaki in view of Kobayashi would render obvious present inventions of claims 8-10 and 12-14.

With respect to present claims 18-20, Kobayashi teaches (col.20, lines 40-44) that the weight ratio of the acid generator that generates a carboxylic acid to the acid generator that generates an acid other than a carboxylic acid is usually 0.01 to 5. Therefore, it would have been obvious to one of ordinary skill in the art to use iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids together with Toshiaki's photoacid generator in Toshiaki's invention in the weight ratio of 0.01-5 in order to markedly suppress the problems of "nano-edge roughness" or "coating surface roughness" as taught by Kobayashi. The prior art's range of 0.01 to 5 teaches present range of claim 18. The prior art's range also overlaps with present ranges of claims 19 and 20, and thus the prior art's range would have made the present ranges of claims 19 and 20 *prima facie* obvious. In re Wertheim, supra. Therefore, Toshiaki in view of Kobayashi would render obvious present inventions of claims 18-20.

With respect to present claims 15-17, since Toshiaki uses 0.1 grams of the photoacid generator in their Example 3 and since Kobayashi teaches (col.20, lines 40-44) that the weight ratio of the acid generator that generates a carboxylic acid to the acid generator that generates an

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acid other than a carboxylic acid is usually 0.01 to 5, this will give 0.001 - 0.5 grams for iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Assuming that one adds 0.001 grams of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids to the resist composition of Toshiaki's Example 3, this will give 5 wt% of Toshiaki's photoacid generator and 0.05 wt% of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Assuming that one adds 0.5 grams of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids, this will give 4 wt% of Toshiaki's photoacid generator and 21 wt% of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids. Therefore, the amount of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids that is added to Toshiaki's photoresist composition will range from 0.05-21 wt% excluding the solvent. This range for the amount of iodonium salts of carboxylic acids or sulfonium salts of carboxylic acids overlaps with present ranges of claims 15-17 thus rendering the present ranges of claims 15-17 *prima facie* obvious. In re Wertheim, supra. Therefore, Toshiaki in view of Kobayashi would render obvious present inventions of claims 15-17.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiaki et al (JP 11-282163 and its English abstract provided by Derwent) in view of Kobayashi et al (6,136,500) as applied to claim 21 above, and further in view of Tan et al (6,004,721).

Toshiaki in view of Kobayashi with respect to present claim 21 is discussed in Paragraph 7 above.

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With respect to present claim 11, Toshiaki in view of Kobayashi do not explicitly teach the presently claimed alkali-soluble resin without containing the acid-decomposing group. Tan teaches (col.19, lines 15-20) that an alkali-soluble resin not containing acid-decomposable groups can be added to a positive photoresist composition in order to improve sensitivity. It is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add an alkali soluble resin into the photoresist composition taught by Toshiaki in view of Kobayashi in order to improve sensitivity as taught by Tan et al. Therefore, Toshiaki in view of Kobayashi and further in view of Tan et al would render obvious present invention of claim 11.

9. It is to be noted that Yasunami (6,270,941 B1) was not used to reject present claims under 35 U.S.C. 103(a) because PTO's record shows that the assignment of the patent to Fuji Photo Film Co., LTD was recorded on January 28, 2000 and the assignment of instant application to Fuji Photo Film Co., Ltd was recorded on December 27, 2000. Since the record shows that the present invention and Yasunami'941 were commonly owned at the time of the making of the present invention, Yasunami'941 is not available as prior art under 103(c).

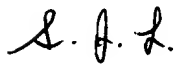
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (703) 305-0504. The examiner can normally be reached on Monday-Friday from 8:30 am EST to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Janet Baxter, can be reached on (703) 308-2303. The fax phone number for the

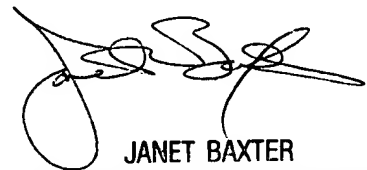
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organization where this application or proceeding is assigned is (703) 872-9311 for after final responses or (703) 872-9310 for before final responses.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.



S. Lee  
December 30, 2002



JANET BAXTER  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700